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**The Continuing Relevance of Keynes's
Philosophical Thinking:
Reflexivity, Complexity, and Uncertainty**

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**The Continuing Relevance of Keynes's Philosophical Thinking:
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Abstract: This paper explains the continuing relevance of Keynes's philosophical thinking in terms of his anticipation of complexity thinking in economics. It argues that that reflexivity is a central feature of the philosophical foundations of complexity theory, and shows that Keynes employed an understanding of reflexivity in both his philosophical and economic thinking. This argument is first developed in terms of his moral science conception of economics and *General Theory* beauty contest analysis. The paper advances a causal model that distinguishes direct causal relationships and reflexive feedback channels, uses this to distinguish Say's Law economics and Keynes's economics, and explains the economy as non-ergodic in these terms. Keynes's policy activism is explained as a complexity view of economic policy that works like self-fulfilling and self-defeating prophecies. The paper closes with a discussion of the ontological foundations of uncertainty in Keynes's thinking, and comments briefly on what a complexity-reflexivity framework implies regarding his thinking about time.

Keywords: Keynes, complexity, reflexivity, non-ergodic, policy activism, uncertainty, time

JEL codes: E12, B41

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1 The reflexivity-complexity foundations of Keynes's philosophical thinking

I argue that the 'continuing relevance' of Keynes's philosophical thinking is due not only to the originality of Keynes's insights at the time that he wrote but also to his anticipating philosophical ideas that we are only now beginning to appreciate in connection with the emergence of complexity thinking in economics. In this paper, then, I will explain Keynes's philosophical thinking in terms of its anticipation of complexity theory. Roberto Marchionatti (2010) previously made a related argument through a careful examination of Keynes's *Treatise on Probability* and *The General Theory*. I will follow his lead but attempt to extend his analysis by arguing that reflexivity is a central feature of the philosophical foundations of complexity theory, and by showing that Keynes employed an understanding of reflexivity and reflexive relationships in both his philosophical and economic thinking.

A fundamental philosophical concept in Keynes's thinking, of course, is his conception of uncertainty. Thus, with my focus on reflexivity and complexity, I will argue that Keynes's understanding of uncertainty rests on a reflexivity-complexity theory basis, which I characterize as an ontological basis because it concerns the nature of reality. I will contrast this foundation for Keynes's uncertainty concept with the epistemic basis often ascribed to it associated with the idea that we are simply cannot know the future, and argue that the epistemic basis for the concept presupposes the ontological one.

Thus the philosophical discussion in the paper moves from reflexivity to complexity to uncertainty. Of these subjects, reflexivity is the relatively unexamined domain, at least in regard to Keynes's thinking. However, I argue that many years ago Keynes made reflexivity key to both his 1938 characterization of economics as a moral science and his *General Theory* beauty contest characterization of agent interaction and speculative behavior by showing how causal relationships are accompanied by feedback effects. In doing so he outlined two interconnected ways in which reflexivity operates in economics: how the economy functions as sets of reflexive processes driven by the behavior of reflexive agents, and how the whole of economy and its parts reflexively affect each other. This paper argues that together these two dimensions of Keynes's philosophical thinking provide foundations for explaining how and why the economy functions as a complex system, provides a key to Keynes's conception of uncertainty in the economy, and tells us something about his view of time.

The organization of the paper is as follows. Section 2 discusses the reflexivity-complexity philosophical foundations of Keynes's moral science conception of economics and his beauty contest analysis. First, I argue that in his characterization of economics as a moral science Keynes

advances a reflexive, two-way circular causality conception of the economic process that contrasts with Lionel Robbins' one-way linear causality conception. I associate this reflexive process conception with one meaning of complexity. Second, I argue that in his beauty contest analysis Keynes uses reflexivity reasoning to support a second meaning of complexity associated with part-whole relationships in complex systems. The discussion in this section thus makes causal analysis central to Keynes's philosophical thinking – a focus which has gone relatively neglected but which I suggest should be fundamental to philosophical analysis in economics.

Section 3 moves to how Keynes's philosophical thinking anchors his economic thinking. First, I show how reflexivity-complexity thinking in Keynes's moral science conception and beauty contest analysis provides the basis for his critique of classical Say's Law economics and underlies his demand-driven understanding of the economy. Second, to be more explicit about the causal thinking involved, I lay out a formal causal model to illustrate what distinguishes a Say's Law economics and Keynes's economics, and then use this difference to argue that Keynes's economics implies a non-ergodic understanding of the economic process. Third, to complete this discussion, I explain how an activist economic policy based on this causal model and Keynes's understanding of the economy makes use of self-fulfilling and self-defeating prophecy reasoning.

Section 4 turns to Keynes's uncertainty concept and time. First I argue that Keynes's famous characterization of uncertain knowledge that emphasizes the absence of probability distributions presupposes an ontological basis for why knowledge is uncertain. I then explain this ontological basis for Keynes's uncertainty concept in terms of what reflexive agents are and how their behavior produces reflexive economic processes. Second, I discuss how Keynes's thinking about time, as recently reviewed by Anna Carabelli and Mario Cedrini (2016), rejected treating time as if it were a spatial magnitude, and thus also reflects his reflexivity-complexity philosophical thinking.

Section 5 comments briefly on the paper's arguments in relation to the Keynes and philosophy literature.

2 Keynes on economics as a moral science and the beauty contest

Keynes's moral science conception of economics and his beauty contest account of speculative behavior are generally discussed independently of one another. I argue, however, that his account of speculative behavior presupposes his conception of economics as a moral science, because that conception builds on a specific understanding of the nature of the economic process essential to

his beauty contest analysis. Yet Keynes's understanding of the economic process is not generally emphasized in discussions about his moral science conception. Rather the emphasis often lies on how for Keynes economics is not a natural science (as it was for Robbins) because it deals with, as he put it, "motives, expectations, psychological uncertainties" (Keynes, CW 14, 300). Yes, certainly a key aspect of Keynes's moral science view is that economics is unlike the natural sciences, which do not investigate such phenomena. But what also needs to be emphasized are what the methodological implications of this are for how economics needs to be pursued in light of the distinctive nature of its subject matter.

a. *Keynes's moral science conception of economics*

Consider first the methodological implications of Robbins' conception of economics as the study of the relation between ends and scarce means with alternative uses (Robbins, 1935). Robbins arguably employed this means-ends type of explanation because he believed markets generally move to equilibrium. If markets generally move to equilibrium, agents can then choose means that reliably produce their ends, thus justifying his means-ends view of economics.¹ However, what often goes overlooked about this is that this meant that the economic process could be represented in a relatively simple causal manner as a linear, one-way movement from cause to effect. Economics would then essentially be the study of equilibrium outcomes that these simple causal processes produce, while the study of the processes determining those outcomes could be largely set aside.

Suppose, however, that markets do not always move smoothly to equilibrium.² Then the means that agents adopt must often fail to produce their desired ends and they accordingly need to be

¹ It also meant that agents could then be seen as engaging in optimizing behavior.

² Keynes's remarks in a radio talk, "Poverty in plenty: Is the economic system self-adjusting?" (*The Listener*, 21, November 1934) expressed essentially just this view:

On the one side are those who believe that the existing economic system is, in the long run, a self-adjusting system, though with creaks and groans and jerks, and interrupted by time lags, outside interference and mistakes. [...] These authorities do not, of course, believe that the system is automatically or immediately self-adjusting. But they do believe that it has an inherent tendency towards self-adjustment, if it is not interfered with and if the action of change is not too rapid. On the other side of the gulf are those who reject the idea that the existing economic system is, in any significant sense, self-adjusting. They believe that the failure of effective demand to reach the full potentialities of supply, in spite of human psychological demand being immensely far from satisfied for the vast majority of individuals, is due to much fundamental causes. (Keynes, CW 13, 486-487).

able to adjust their behavior. Such adjustments complicate Robbins' linear, means-ends, cause-to-effect logic, because they introduce feedback effects from the ends agents' choices actually produce but do not desire back upon their future means for the production of their intended future ends – a two-way circular causal process generated by this reflexive feedback relationship between means and ends. Keynes recognized, then, that when agents need to regularly adjust their behavior we need to focus on their “motives, expectations, [and] psychological uncertainties” rather than simply on equilibrium outcomes, because their open-ended and revisable nature is central to explaining both how the economy operates when not in equilibrium, and also to explaining what determines equilibrium outcomes, if and when they occur. The foundation of Keynes's moral science conception of economics with its emphasis on “motives, expectations, [and] psychological uncertainties,” I thus claim, is this two-way, circular account of causality rooted in this reflexive relationship from means to ends and ends to means. On this view, Keynes's moral science conception of economics could also be termed a reflexive process conception of economics.³

This causal account consequently provides of us one of two meanings of complexity I distinguish, namely, the idea of a process that is not simple and linear because it is causally circular. An economy understood in this way, then, is complex not just epistemically – because the phenomena we seek to explain are, in Keynes's words, “in too many respects, not homogeneous through time” (CW 14, 297) – but also complex ontologically, because the causal process that drives the economy works through sets of interacting forward and backward linkages across time. But how is this meaning of complexity actually derived from the idea of reflexivity? One of the main meanings of reflexivity is the self-reference idea of something that reflects back upon and acts upon itself (Sandri, 2009, 10). This, then, is what we see when agents' means act on both their ends and also on their subsequently adjusted means. In effect, via the intermediation of more or less successfully achieved ends, agents' means reflexively operate on their means.

Keynes did allow after the publication of *The General Theory* that his theory could be represented as assuming short-period expectations were always fulfilled and then represented as seeing the difference it makes when we say they are disappointed (CW, 14, 181). Thus, however, one models the short-period for reasons of method (cf. Kregel, 1976; Chick, 1983; Carabelli and Cedrini, 2014), Keynes clearly did not assume that expectations had to be fulfilled, as essentially Robbins did. I return to this issue in section 4.

³ I do not discuss here, nor below, how, in economic terms, agents act when they know they cannot know the effects of a decision made today on the future. The explanation lies in their recourse to the institution of spot and forward money contracts, which facilitate their ability to adjust their behavior. Thanks to Paul Davidson for this point (cf. Davidson, 2015, chapter 4).

The second meaning of complexity I distinguish concerns systems rather than processes, and this meaning relates reflexivity to complexity in a different yet related way, which we will see is particularly important to Keynes's aggregative economics. Thus, in Herbert Simon's influential part-whole understanding of systems, a complex system is one in which "a large number of parts ... interact in a non-simple way ... [such that] the whole is more than the sum of the parts" (Simon, 1962, 359). In complex systems, then, the interaction of the system's parts produces an aggregate outcome at the level of the whole system which, because not reducible to that interaction, feeds back on and affects the nature of that interaction. Then this changed interaction at the level of the system's parts produces a new aggregate outcome, which in turn feeds back on that interaction, and so on and so on, in a continuing dynamic between action on these two levels. So here feedback effects run from parts to whole and whole to parts, and this provides a further way in which reflexivity underlies complexity, one moreover that complements how reflexivity works at the level of the economic process through feedback relationships between agents' means and ends.⁴

Note that Walrasian macroeconomics ignores the feedback path from whole to parts via its microfoundations doctrine that fully derives the economy as a whole from the activity of its parts. Agents' actions and equilibrium outcomes are perfectly compatible with one another, making the relationship between parts and whole static and timeless. Thus the Walrasian approach extends Robbins' one-way causality account regarding the nature of the economic process to a one-way causality account of the parts-whole relation. The parts (agent behavior) are fully responsible for the whole (the nature of the economy), producing a simple rather than complex understanding of the economy as a whole as a companion to the linear understanding of the economic process.

In Section 3 I will discuss how the system level understanding of complexity is central to Keynes's critique of classical supply-side economics and demand-driven understanding of the economy, but to introduce this discussion I first want to discuss the connection between Keynes's moral science conception and his beauty contest analysis. I have argued that Keynes's moral science view, with its focus on agents' "motives, expectations, psychological uncertainties," is rooted in a specific conception of what sort of process operates in the economy. However, his beauty contest analysis, with its attention to a structure of expectations over and above individual expectations, employs a systems-parts reasoning. I will try to show, then, that this latter analysis both

⁴ For a direct application of this part-whole relation to Keynes's economics, see Harcourt's two views of how the relation can work in his 'wolf pack' analogy (1995).

presupposes the feedback logic of Keynes's process conception, and also extends it to a system level reflexivity-complexity view that also operates in his economics.

b. Keynes's beauty contest analysis

How, then, does Keynes's beauty contest treatment of speculative behavior employ reflexivity reasoning (CW 7, 156)? On the surface, what Keynes's analysis does is demonstrate how a world framed in terms of agents' "motives, expectations, psychological uncertainties" can generate financial market phenomena that are "in too many respects, not homogeneous through time." Why this happens, however, is not immediately clear, since, as rational expectations thinking shows, it is neither necessary nor obvious that 'psychological uncertainty' *per se* should produce such a world. Note, then, that a key assumption of rational expectations thinking is that agents form their expectations independently of one another as isolated agents. In contrast, in Keynes's beauty contest agents form their expectations interdependently. Accordingly, if rational expectations agents are thought to form their expectations in regard to 'fundamentals' (in effect, the inherent beauty of the women in the newspaper pictures), then Keynes's agents form their expectations, not only in regard to these 'fundamentals,' but also by attending to what they believe other agents believe constitute the 'fundamentals' of those newspaper pictures.

Thus, in the first instance a feedback relation runs for each individual agent from a belief about other agents' beliefs back to that individual agent's own beliefs – a reflexive relation that operates at the process level. Yet since agents form their expectations interdependently, and all agents' expectations indirectly affect all other agents' expectations, there additionally exists a feedback relation that runs from the entire structure of interdependent agent expectations back to each individual agent's expectations – a reflexive relation between whole and part. Thus the beauty contest analysis combines both the process and systems reflexivity-complexity connections, and the complexity of the situation Keynes describes then derives from how these two reflexivity-complexity connections interact in particular circumstances.⁵

The expectations of Keynes's individual agents, then, are potentially subject to constant adjustment since a change in any one agent's beliefs about other agents' expectations could set off a chain of inter-agent adjustments that affect the structure of expectations which in turn then feeds back on and affects these adjustments. Neoclassical economists often argue, of course, that

⁵ Soros (e.g., 2013) also frames the link between Keynes's beauty contest analysis and a rejection of rational expectations thinking in terms of reflexivity and complexity, but does not explicitly distinguish the process and part-whole senses of reflexivity-complexity I have employed here.

over time individual agents should improve their beliefs and expectations in a Bayesian kind of way as they learn about an expectation adjustment process, and so that they would not constantly keep revising their expectations. Note, then, that this view of expectation adjustment is formulated strictly at the process level, and ignores the systems level source of complexity. That is, it rules out that the economy as a whole is affected by agents' revising their expectations and how this could feed back on and affect that adjustment process. In effect, assuming that agents do not keep revising their expectations is tantamount to assuming that the path of the economy is independent of the overall expectation formation process, or, as Robbins thought, that the economy inevitably moves to equilibrium.

Keynes, however, used his beauty contest analysis to show that when agents form their expectations interdependently, the adjustment in individual expectations that occurs at the level of the economic process creates a structure of expectations that is also in constant adjustment relative to this process. Thus, if his moral science conception of economics was not persuasive to economists who accepted Robbins' simple linear cause-effect view of economics, his beauty contest analysis of speculative behavior offered a concrete way of making the case that economics is a complex science by showing that it also dealt with complex part-whole relationships. The advantage of that demonstration, moreover, was that it went beyond general claims about the nature of causality in economics in regard to the nature of the economic process, and modeled a specific overall structure of interaction that clearly worked through a reflexive feedback channel. To illustrate this, I formally represent how this feedback channel works in the next section.

Perhaps less obvious in all this is that Keynes's focus on "motives, expectations, psychological uncertainties" suggests that we needed a new characterization of the economic agent alternative to Robbins' means-ends (optimizing) agents. If we characterize such agents as *reflexive economic agents*, then their principle characteristic is not instrumentally rational optimizing behavior but rather being able to constantly adjust to change in the basis on which they act. In section 4 I use this characterization to explain how Keynes's uncertainty concept has an ontological basis. That is, ultimately his reflexivity reasoning underlies his uncertainty concept because ontologically speaking economic agents' reflexive behavior produces uncertainty. Let me turn now to how Keynes's economics rests on this reflexivity-complexity theory foundation.

3 Keynes's economics and policy activism

Here, I first connect Keynes's moral science and beauty contest reflexivity and complexity thinking to his critique of Say's Law and his demand-driven understanding of the economy. Second, I develop a causal model to show how the presence or absence of a feedback channel differentiates linear from a circular causal representations of the economy, and then use this to argue that the presence of a feedback channel in circular representations implies the economic process is non-ergodic. Third, I discuss how the circular causal model frames economic policy in terms of ideas of self-fulfilling and self-defeating prophecies.

a. *Keynes's critique of Say's Law and his demand-drive alternative*

Say's Law, the idea that supply creates its own demand, means an economy's resources determine its level of output, and demand plays only a passive role in buying back produced output. An economy's resources are thus its scarce means and its level of output, demanded and consumed, is the end those resources are used to produce. For Keynes, then, this explanation involves another expression of Robbins' one-way, means-ends, cause-to-effect reasoning, which in this instance ignores how demand, should it be insufficient and fail to buy back produced output, has a feedback effect on supply through the adjustments it sets off on the part of producers. That is, Keynes's critique of Say's Law relies on his two-way circular understanding of causality in which a reflexive relationship operates both from means to ends and ends to means across aggregate supply and demand.

Specifically, at the level of the economic process, this works through how producers' "motives, expectations, psychological uncertainties" factor into their constant efforts to estimate demand. Failure to forecast demand correctly causes adjustments on their part that give demand feedback effects on supply. Then in terms of the economy as a part-whole system, this works through how the interaction of the components of aggregate demand (the parts of the whole) influences the level of output (the whole of the economy) and how changes in the level of output in turn influence the interaction between the components of demand. Should, say, consumption and investment goods not be demanded in the proportion in which they have been produced, the total output subsequently produced will likely change. This in turn is likely to influence the composition of future demand for consumption and investment goods, which then likely influences total output subsequently produced, and so on and so on. In contrast to Robbins' classical focus on equilibrium outcomes, then, Keynes's focus is on the economic process and how the economy adjusts when not in equilibrium.

If this explains Keynes's critique of Say's Law in reflexivity terms, consider now how this two-way circular understanding of cumulative causality operates in Keynes's demand-driven understanding of the economy, particularly in regard to important role played by investment spending. Recall that one of the main meanings of reflexivity is the self-reference idea of something that reflects back on and acts upon itself. I illustrated this above in connection with how at the level of the economic process agents' means reflexively operate on their future means via the intermediation of more or less successfully achieved ends. In the case of Keynes's aggregate demand analysis, then, we can see this two-way dynamic through the multiplier-accelerator relationship between investment and the economy's resources used in production. That is, in process terms just as those resources are means to investment spending, so investment spending is a means to producing additional resources for production, so that at the process level investment reflexively acts upon itself. This two-way dynamic also works in terms of the economy as a whole through the multiplier. Changes in demand, whatever the source, work through the multiplier to change the size of the economy. But change in the size of the economy then influences the circumstances determining demand. Thus the parts of the economy, the components of aggregate demand, affect the economy as a whole, which in turn affects those parts or components in a continuing dynamic centered on the role of aggregate demand.

b. Linear and circular causal models of the economy

So the difference between the classical Say's Law view of the economy and Keynes's demand-driven view comes down to an ontological disagreement over the nature of the causal process governing the economy. I have argued that this disagreement is ultimately a matter whether reflexivity operates through a feedback channel and plays a significant role especially in regard to the overall causal process governing the economy. To show this formally, I provide a causal model that includes both a standard linear cause-effect relationship and also a feedback channel whereby this relationship acts on itself. I first model the Say's Law case where the feedback channel exists but is benign and only confirms Say's Law. I then model Keynes's thinking where the feedback channel plays an important role and refutes Say's Law.

The Say's Law model of the economy, then, assumes a direct cause-effect relationship between an economy's resources, a , and the economy's level of output, b , or:

$$a \rightarrow b \quad [1]$$

How then does the feedback channel work in the Say's Law case? Since the demand for output can only play a passive role restricted to buying back that output, economic agents must believe that [1] is the case, must form expectations appropriate to this belief, and must act consistently with [1]. Thus the resources-output cause-effect relationship [1] acts reflexively on itself but only so as to confirm itself:

$$a \rightarrow b \rightarrow (a \rightarrow b) \quad [2]$$

That is, [2] asserts that not only does supply create its own demand as in [1], the first part the expression, but [1] produces itself, as shown in the second part of the expression as $(a \rightarrow b)$.

Note that [1] and [2] represent two different causal relationships, where [1] is a direct causal relation between a and b , and [2] is the feedback channel showing how that direct causal relation acts on itself. Putting these together for their combined overall effects (\Rightarrow) thus tells us that the economy's resources alone determine the level of output, b , and the Say's Law relation, $(a \rightarrow b)$, holds:

$$a \text{ and } a \rightarrow b \text{ and } a \rightarrow b \rightarrow (a \rightarrow b) \Rightarrow b \text{ and } (a \rightarrow b) \quad [3]$$

Thus, since the feedback channel fully validates the direct causal relation in the sense of showing it to be a complete and sufficient representation of the economy, the causal model is effectively linear.

Contrast this with Keynes's case. The economy's resources, a , still affect level of output, b , so [1] as a direct causal relation still holds. But agents' beliefs, expectations, and actions influence how the economy's resources determine that level of output, so the feedback channel – how the direct causal relation acts on itself – changes the nature of the relation between a and b , so that [2] is then replaced as follows:

$$a \rightarrow b \rightarrow (a \rightarrow b)' \quad [4]$$

That is, the $(a \rightarrow b)'$ relation represents how the economy's resources determine the level of output according to the influence demand has on that relation, and Say's Law no longer holds.

Finally, replacing the $a \rightarrow b$ relation by the $(a \rightarrow b)'$ relation, [3] is then replaced for overall effects as follows:

$$a \text{ and } a \rightarrow b \text{ and } a \rightarrow b \rightarrow (a \rightarrow b)' \Rightarrow b \text{ and } (a \rightarrow b)' \quad [5]$$

In this case, the Say's Law linear causal analysis with its benign feedback channel is replaced by Keynes's circular causal analysis with a feedback channel that modifies the direct effects of resources on output. Resources still affect output as in [1], but how they affect output depends on how that relation affects itself through agents' expectations, beliefs, and actions regarding the relation between resources and output.

The model, then, makes explicit the role reflexivity plays in Keynes's thinking via the difference it makes in causal analysis. Expression [1] involves a standard form of causal reasoning in showing how one factor (or set of factors) operates on another factor. But expressions [2] and [4] go beyond this 'between factors' type of causal analysis to show how an entire causal relationship can act on itself (in two different ways). Robbins' and Say's Law causal thinking is restricted to the more traditional 'between factors' type of causal analysis, and for that reason involves a linear kind of explanation that lends itself to an equilibrium view of the economy. Keynes's causal thinking was richer in recognizing that causal relationships can also act upon themselves. This meant that economies followed complex causal paths, and do not necessarily move to equilibrium. His aggregative economics, accordingly, involved not just a new method of analysis, but also a methodological departure from neoclassical economics in explaining the economy not only at the level of causal relations between factors operating within the economy, but also at the level of change in the causal relationships governing whole of the economy.

This thinking has one very important implication for how we understand the dynamics of economies. On a Say's Law neoclassical view of the world, the benign feedback channel makes

Say's Law a law in the strong sense in natural science of a relationship that holds independently of human behavior. Alternatively, the economy is thought to work as a dependable mechanism whose performance is never changing in the manner of a law of nature. It also means that a Say's Law world is a world that is closed, deterministic, and ergodic.⁶

Contrast this with Keynes's view of the world. The way the economy works is not independent of human behavior. Though we can identify 'law-like' relationships such as [1], they do not work in an unchanging, natural science way, and thus the economic world should be seen as open, non-deterministic, and non-ergodic. As Paul Davidson (1996) puts it, the economic world is 'transmutable' because human behavior modifies and changes those relationships. I turn now to what this implies about the nature of economic policy.

c. *Economic policy in terms of self-fulfilling and self-defeating prophecies*

Of course also distinctive of Keynes economics is his rejection of classical economics' *laissez faire* stance toward the economy in favor of an activist view of economic policy. Understandably, if one operates with a classical, linear causal view of an economy that always moves to equilibrium, there is little basis for policy activism, and so many of Keynes's critics who operate with this causal thinking have likely thought his activist stance incomprehensible. Yet if the economy is open and changed by human behavior, then economic policy can be instrumental in determining the economy's pathway.

It seems that there are two senses, then, in which an activist economic policy can influence the economy depending on one view of the causal nature of the economy. One could still employ a 'between factors' linear causal thinking, and argue that policy acts like pulling a mechanical lever to speed convergence to an equilibrium determined by the relationships between the main factors governing the economy, perhaps as understood in an ISLM type of Keynesianism. Alternatively, one could recognize that how policy is constructed influences the way in which the main factors governing the economy operate, and thus see policy as not only acting like a lever, but as also affecting how economic agents act in regard to the relations believed to govern the economy. That is, policy can operate not only on the direct causal relationships operating in the economy, but

⁶ There is a recent extended debate regarding ergodicity versus non-ergodicity in Keynes's thinking between Paul Davidson and Rod O'Donnell (see Rosser, 2015). I do not address this debate for reasons discussed at the beginning of section 4.

also on the feedback channel through which agents judge and act on those relationships.

Keynes emphasized this latter role in his attention to how the state of long-term expectations in the economy depends on the state of confidence. First he asserted that, “The state of long-term expectation, upon which our decisions are based, does not solely depend ... on the most probable forecast we can make” (Keynes, 1973, 148). Any “probable forecast” that agents make, then, would concern the main factors governing the economy – the ‘between factors’ linear causal thinking - and thus the direct causal relations believed to hold between those factors. But, Keynes then goes on to say: “It [the state of long-term expectations] also depends on the *confidence* with which we make this forecast or how highly we rate the likelihood of our best forecast turning out quite wrong” (*Ibid.*; his emphasis). Here by confidence he refers to how confident agents are that those causal relations about which they make probable forecasts are as they have been in the past or whether they have changed. Thus here Keynes effectively asks how those direct causal relations reflexively act upon themselves, that is, through the feedback channel.⁷

Consequently, Keynes saw economic policy as operating in an environment of judgments and expectations about the stability and determinacy of causal relationships governing the economy. In general, he believed that environment tended to be relatively settled and most causal relationships were typically taken to hold most of the time. “In practice we have tacitly agreed, as a rule, to fall back on what is a *convention*. The essence of this convention ... lies in assuming that the existing state of affairs will continue indefinitely, except in so far as we have specific reasons to expect a change” (*Ibid.*, 152). It follows from this, however, that matters are not expected to “continue indefinitely” when agents “have specific reasons to expect a change,” one instance of which is when economic policies are put in place that are explicitly designed to give agents “specific reasons to expect a change” in “the existing state of affairs.”

Broadly speaking, then, what Keynes is referring to is the possibility that policies can change expectations and attitudes in such a way as to realize policy goals through the effects they can have on agents’ views of how economic relationships are likely to operate. Such policies act, I suggest, like self-fulfilling and self-defeating prophecies. Robert K. Merton explained a self-fulfilling prophecy as a prediction that changes behavior in such a way as to cause itself to become true

⁷ The same distinction between direct causal relations and the feedback channel is immediately taken up again on the following page in regard to the marginal efficiency of capital and the state of confidence. The marginal efficiency of capital concerns a direct causal relation between additional capital and additional output. Keynes says, however, that, “The state of confidence is relevant because it is one of the major factors determining the former” (Keynes, 1973, 149). That is, the feedback channel determines how the direct causal relation the marginal efficiency of capital schedule involves operates.

(Merton, 1968). In contrast, a self-defeating prophecy is a prediction that changes behavior so as to falsify itself.⁸ What the two sorts of prophecies share, then, is the idea that agents can be influenced through the feedback channel to change their views about how causal relationships operate in an economy, such that when they act on those views they may actually change how those causal relationships operate.

Suppose, for example, that an economy has protracted high unemployment. A fiscal expansion could both influence income and employment, through the direct relation between income and spending, and also influence the state of confidence, through the feedback channel, and thereby function as a self-fulfilling prophecy. Or suppose an economy faces an inflationary spiral. A fiscal contraction could both work on inflation, through the direct relation between spending and prices, and also work on inflationary psychology, through the feedback channel, and act as a self-defeating prophecy.

From this perspective, Keynes's reflexivity thinking can be interpreted as providing foundations for a complexity understanding of economic policy. David Colander and Roland Kuper (2016) argue that central to a complexity understanding of economic policy is the recognition that policy instruments, thought to work dependably in controlled circumstances, often have counter-intuitive and unexpected effects in complex environments. Self-fulfilling and self-defeating prophecies, then, are counter-intuitive phenomena in that they reverse status quo states of affairs. They do so, moreover, through how the prophecy or prediction changes behavior, which then feeds back on and changes the basis on which the prophecy or prediction was made. A complexity understanding of economic policy, then, relies on the feedback channel that Keynes saw operating on the state of confidence. Essentially, what an activist economic policy therefore does is manipulate reigning conventions in such a way as to encourage economic agents to "have specific reasons to expect a change" where previously they did not.

4 Uncertainty and time in Keynes's philosophical thinking

The goal of this section is to show that a reflexivity-complexity philosophical thinking in Keynes

⁸ Merton's self-fulfilling prophecy example was how a false evaluation of a bank's solvency can precipitate a bank run and cause the bank to become truly insolvent. A famous self-defeating prophecy is the prediction that all computers would crash at the beginning of the year 2000. That prediction changed computer programmers' behavior, so that computers did not crash as predicted. Soros (2013) explains self-fulfilling prophecies in terms of Popper's thinking in *The Poverty of Historicism* (1957).

underlies his uncertainty concept giving it a primarily ontological basis. One consequence of the argument here is that non-ergodicity has a somewhat different basis in Keynes's thought than has recently been debated. A second consequence is that it allows us to attribute a philosophy of time to Keynes that goes beyond the view that the future is simply unknown.

a. *Keynes's uncertainty concept*

I claimed at the outset that I would interpret Keynes's concept of uncertainty in terms of reflexivity-complexity theory, emphasizing the concept's ontological basis in contrast to the epistemic basis that is often emphasized. To be sure, Keynes clearly gives his uncertainty concept an epistemic interpretation in his oft-cited characterization of uncertain knowledge:

By 'uncertain' knowledge, let me explain, I do not mean merely to distinguish what is known for certain from what is only probable The sense in which I am using the term is that in which the prospect of a European war is uncertain, or the price of copper and the rate of interest twenty years hence, or the obsolescence of a new invention, or the position of private wealth-owners in the social system in 1970. About these matters there is no scientific basis on which to form any calculable probability whatever. We simply do not know (Keynes, CW 14, 213).

What he emphasizes here is the lack of probability distributions for such phenomena. But *why* probability distributions are unavailable for certain phenomena is an ontological issue regarding the nature of the world that must accordingly be prior to the epistemic one in determining the meaning of Keynes's uncertainty concept. Indeed, it seems fair to say this is the way Keynes saw the matter. Consider the recent debate, then, over Keynes and ergodicity versus non-ergodicity.

That debate has focused on whether probability distributions for economic phenomena are knowable.⁹ But of course if probability distributions do not exist for certain phenomena, those distributions are not only not knowable, but the whole question regarding whether they can or cannot be known is beside the point. Keynes essentially says this when he asserts that sometimes they are simply unknowable. Indeed, since the lack of probability distributions for phenomena means those phenomena cannot be homogeneous, stationary, or ergodic (Rosser, 2015), Keynes's

⁹ See footnote 4. This is O'Donnell's focus in rejecting non-ergodicity as a basis for Keynes's uncertainty concept. However, Davidson's argument in favor of non-ergodicity is based on an ontological understanding of Keynes's uncertainty concept.

view that the phenomena are not homogeneous or stationary means they are also non-ergodic (even though he did not use this concept). So Keynes's comment that uncertain knowledge is that about which "We simply do not know" short-circuits the ergodicity versus non-ergodicity debate since he presupposes that the economic world is non-ergodic, because he presupposes that uncertainty is ultimately an ontological matter.

Thus, since my argument in this paper has been that Keynes's reasoned ontologically in reflexivity terms, we should be able to explain his concept of uncertainty in reflexivity terms. Above I explained a reflexive economics process in terms of the behavior of what I called reflexive economic agents. Let me first be more explicit about what a reflexive agent is by comparing that conception with the traditional utility maximizing agent (cf. Davis, 2016, 2017). For the latter, the basis on which action occurs is unchanging, as in Robbins's means-ends type of explanation. Indeed, traditional instrumental rationality analysis requires that the basis on which choices are made be taken as given (as in exogenous preferences) in order to function as determinate means to agents' utility maximum ends. In contrast, for reflexive agents, a conception I have attributed to Keynes with his emphasis on "motives, expectations, [and] psychological uncertainties," the basis on which action occurs is always changing as they constantly re-appraise the relation between ends and means, adjusting their behavior in such a manner as to create a reflexive relationship from means to ends and ends to means.

This reflexive agent conception, and the reflexive process conception it produces, is thus what ultimately makes the world uncertain for Keynes, since, as well demonstrated in his beauty contest analysis, the world evolves according to how agents' "motives, expectations, [and] psychological uncertainties" interact and change – a matter Keynes clearly believed to be inherently uncertain. A consequence of this, then, is that the world is indeed non-ergodic, but the basis for non-ergodicity in Keynes's thinking is not epistemic but rather ontological. In effect, we need not even ask whether the phenomena empirically are homogeneous and stationary because we know that economic relationships are constantly subject to change. Borrowing an expression and explanation from Sheila Dow, "fundamental uncertainty is endogenous to behaviour and to [the economy's] structure," both of which are constantly subject to change due to the "openness of the economic system" (Dow, 2015, 36).

b. Keynes philosophical thinking about time

Finally, I comment on what reflexivity implies about Keynes's thinking about time. Carabelli and Cedrini (2016) argue that Keynes never opted for a 'mechanistic approach' to time because from early in his time at Cambridge, when he first considered the difficult issue of how time might be measured, he believed it was impossible to produce a determinate unit of time. A mechanistic approach represents time as if it were a spatial magnitude with determinate relations governing the measurement of its extent. But Keynes believed change is essential to time, whereas a spatial magnitude is given and static. This meant for Keynes that time could not be laid out as a succession of equal time intervals ranging across past, present, and future, because there was no way to treat those intervals as comparable to one another when the passage of time involved change. Nonetheless, even if its unit of measurement could not be determined, time understood in terms of change was still susceptible of representation in terms of the fundamental temporal logic of before and after, where the latter involves change from the former.

My argument, then, is that Keynes's thinking about time is closely linked to his thinking about causality as a two-way relationship between cause and effect dependent upon reflexive feedback. What Keynes's moral science thinking shows when we focus on the behavior of reflexive agents is that since the basis on which they act is constantly transformed by how their actions produce outcomes and ends that were not fully intended, the past – the basis on which they previously acted – is always discontinuous with the present basis on which they must immediately act. Thus time cannot be represented as a succession of equal time intervals. In effect, the passage of time constantly changes how the past and the present relate to one another. Yet at the same time, the past and the present are still connected in time because agents' actions in the past provide the grounds from which they adjust their subsequent behavior. A reflexive process conception of the economy, then, derived from the constantly adjusted behavior of reflexive agents, involves a conception of time that cannot be represented in the manner of a spatial magnitude, but which still involves a connected process of change that temporally distinguishes and links before and after.

To be sure, this analysis is complicated by Keynes's post-*General Theory* ambivalence regarding whether short-period expectations should be thought to be fulfilled or not,¹⁰ since if they are, then agents do not constantly adjust their behavior, and it might be argued that a succession of time periods would then be susceptible to some common unit of measure. A case can be made, however, that in light of his Marshallian heritage Keynes was willing to consider short-period

¹⁰ See footnote 2. Also see Harcourt (1981).

expectations as fulfilled as a practical expedient he regarded as part of a method of analysis – a “two-stages methodology” (Carabelli and Cedrini, 2014). This of course puts the matter on an epistemological level, whereas the argument generally developed in this paper and also with respect to Keynes’s thinking about time puts the things on an ontological level. Thus, if Keynes regarded it as a desirable expedient methodologically speaking to treat short-period expectations as fulfilled, this says nothing about whether he believed that ontologically speaking economies move to equilibria and whether agents do or do not constantly need to adjust their plans. Indeed, Keynes’s thinking about uncertainty clearly tells us that the possibility that agents might need to adjust their plans is always a reality. Thus it seems clear that Keynes never opted for a ‘mechanistic approach’ to time conceived on the order of a spatial magnitude, and that his economics ultimately depends on the idea that time is inseparable from change.

How, then, does Keynes’s thinking about time reflect the idea that the economy complex? The two ways I argued his moral science conception and beauty contest analysis explain complexity are respectively at the level of reflexive processes and in terms of reflexive part-whole relationships. Both operate and interact with one another, I then argued, in how the economy is complex for Keynes. So we might also ask, what conception of time is appropriate to an economy understood to be complex? Quite simply, just as a non-complex, linear causal view of an economy encourages us to represent time as if it were like a spatial magnitude, rolling out into the future in a succession of intervals no different than those that occurred in the past, so a complexity view of an economy rejects this conception for a view of time in before and after terms, where the latter is discontinuous with but connected to the former. This conception, it should also be emphasized, is not only one that presupposes the economic world is non-ergodic, but also one that justifies an activist view of economic policy as capable of genuinely changing the future.

5 Concluding comments on the Keynes and philosophy literature

I suggested at the outset that making causal analysis central to Keynes’s philosophical thinking produces a focus that has gone relatively neglected in Keynes scholarship. My view is that the reason for this neglect is that many commentators implicitly think in terms of a linear, ‘between factors’ type of causal analysis, and so fail to systematically examine the reverse causal pathway that feedback effects involve, despite evidence that Keynes recognized the existence of feedback effects. Thus they fail to appreciate the distinction between a direct, ‘between factors’ type of causal relation and a feedback channel operating on that direct relation, and consequently lack

grounds for understanding how the economy can be regarded as complex. Partly, it seems, the reason for this is that the philosophy of Keynes has long been associated with the epistemology of Keynes, so that the issue of what Keynes's ontological thinking has been little investigated, if even recognized. So in my view many of the disputes about Keynes's philosophical thinking – for example, the non-ergodicity dispute – have failed to come to ground, because they have not addressed what these issues ultimately concern. That concern is how the world works, a matter that is prior to how we think about how agents think it works, and thus prior to how we think about the role knowledge plays in the world.

Beyond the causal model presented here, with its distinction between a direct, 'between factors' relation and a feedback channel operating on that direct relation, what else is central to the argument of this paper is its characterization of economic agents, which I have argued Keynes at least implicitly held given his beauty contest analysis. In contrast to the standard, means-end agent conception with its fixed basis for action, the basis for action in the case of reflexive agents is always changing as a result of how they see the way in which the effects of their actions feed back on their subsequent means and ends. Needless to say, the idea of a reflexive agent conception has little following in contemporary economics, whereas the standard linear utility conception is widely held. I suggest, then, that in part a further reason scholarship on Keynes's philosophy has been relatively restricted in the issues it addresses is that many commentators also implicitly hold the standard conception of an agent – and perhaps do not even consider that an alternative conception is needed – and thus also assume Keynes must have had such a conception as well, despite the evidence of his beauty contest.

In this light, it seems fair to say that if the twin, mutually stabilizing pillars of (neo-) classical philosophical thinking are equilibrium theory and utility maximizing agents, then those who implicitly hold to these pillars are likely to see Keynes philosophically as not much different. In all fairness, many Keynes scholars and Keynesians are quite critical of equilibrium theory (even when they still tend to think in linear causal terms). But if they ultimately retain at least implicitly the utility maximizing agent conception, then it seems unlikely that they will see the economy as complex. The economy could still be seen as 'open' and non-ergodic because of uncertainty, but then agents' behavior could also be seen as a 'rational' response to an uncertain world, not the behavior agents would exhibit in a complex world. Thus, as argued above, I believe uncertainty in Keynes's thinking needs to be seen as having deeper foundations than often thought. Uncertainty is not only a matter of the fact, as Keynes observed, that we are simply cannot know the future. It is also a matter of how agents actively produce an uncertain world as a result of their

constantly adjusting their behavior in response to more or less unmet ends.

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